

### ABSTRACT

A magnetic resonance detection apparatus is provided that is not susceptible to acoustic ringing, and a method is provided for eliminating or canceling acoustic ringing from a detected magnetic resonance signal. Specifically, a composite pulse is utilized that allows for both efficient reduction of acoustic ringing signals and the detection of true NQR signals. The composite pulse can be used in any of the common NQR pulse sequences currently utilized simply via substitution of the original single pulses with the composite pulse. Furthermore, although a preferred application involves the spin-1 nucleus  $^{14}\text{N}$  and NQR, the composite pulse will be useful for the NQR of other nuclei such as  $^{35}\text{Cl}$  and  $^{39}\text{K}$  and in NMR applications and involving half-integer quadrupolar nuclei and spin- $\frac{1}{2}$  nuclei. In addition, coil ringdown and piezoelectric ringing are also substantially reduced.